Standard Indicators
SCIENCE 6.1.8

Technology Dilemmas

Purpose

Students will describe instances showing that technology cannot always provide successful solutions for problems or fulfill every human need.

Materials

For the teacher: scissors
For each group of students: "Technology Dilemma" card from copy of Black Line Master (BLM) *Technology Dilemmas*, research materials, access to presentation software and the Internet

Activity

A. Pre-Activity Preparation

1. Cut out each "Technology Dilemma" card from the BLM *Technology Dilemmas*.
2. Gather research materials related to the technology dilemmas listed on the BLM *Technology Dilemmas*.

B. Pre-Activity Discussion

1. Ask students: "How has technology improved our lives and our understanding of the world around us?"
2. Discuss with students how the development and use of technology has made life easier by making tasks simpler. Explain that technology has allowed the human species to make amazing accomplishments, such as l landing on the Moon.
3. Ask students: "Are there any drawbacks to the technologies we depend on every day? Can these technologies always provide successful solutions and fulfill every human need?"
4. Discuss students' answers, and tell them that they will work in groups to discuss these issues as they relate to a given form of technology.

C. Description of Activity

1. Divide students into six groups, and distribute one "Technology Dilemma" card to each group.
2. Instruct students to use the Internet and research materials in the room to answer the questions on their cards. Using presentation software, have students write their answers to the questions.
3. Monitor students as they work and ask each group questions about its dilemma, such as:
   - What is the success rate for people who survive heart transplants? What is their life expectancy?

Technology Literacy Standards

	I	II	III	IV	V	VI	VII
1							
2							
3			X				
4			X				
5							
6							
7		X					
8							
9							
10							
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X = This Technology Literacy Standard is addressed in this lesson.

☐ = This Technology Literacy Standard is not addressed in this lesson.

- How do bacteria become resistant to antibiotics?
- Does chemotherapy make cancer patients healthy?
- Have many pests become resistant to pesticides we have engineered?
- What can happen if people depend only on dietary supplements and vitamins and do not eat regular meals?
- What can robots do that humans cannot do? What can humans do that robots cannot do?

4. Allow ample time for each group to research its technology dilemma.

D. Close the Activity

1. Have each group present its technology dilemma and findings to the class. Discuss the results of each group's research as a class.
2. Ask the students: "Can you think of any other instances when technology cannot provide successful solutions for problems or fulfill every human need?"
3. Discuss students' answers, and explain that while technology has improved our lives in some ways, it cannot fulfill every human need.

Classroom Assessment

Basic Concepts and Processes

At the conclusion of the lesson, ask questions such as the following:


Describe one way the technology you researched fulfills a human need and one way it does not.


Can technologies have side effects? Describe one potential side effect you read about.


Did you have any difficulties researching your dilemma?

Technology Dilemmas

HEART TRANSPLANTS

- Describe the technology of heart transplants and whom this technology affects.
- List the benefits and costs involved.
- Describe why this technology might not always provide successful solutions or fulfill every human need.

ANTIBIOTICS & RESISTANCE

- Describe the technology of using antibiotics to treat illness.
- List the benefits and costs involved.
- Describe why this technology might not always provide successful solutions or fulfill every human need.

CHEMOTHERAPY

- Describe the technology of using chemotherapy to treat cancer patients.
- List the benefits and costs involved.
- Describe why this technology might not always provide successful solutions or fulfill every human need.

PESTICIDES IN AGRICULTURE

- Describe the technology of using pesticides to rid crops of pests.
- List the benefits and costs involved.
- Describe why this technology might not always provide successful solutions or fulfill every human need.

MEAL AND DIETARY SUPPLEMENTS

- Describe the technology of the newest meal and dietary supplements.
- List the benefits and costs involved.
- Describe why this technology might not always provide successful solutions or fulfill every human need.

ROBOTS PERFORMING HUMAN TASKS

- Describe the technology of replacing humans with robots and other computers to do work.
- List the benefits and costs involved.
- Describe why this technology might not always provide successful solutions or fulfill every human need.

Technology Dilemmas

Teacher Directions

Distribute a "Technology Dilemma" card from the BLM *Technology Dilemmas* to each group of students and allow ample time for research.

Answer Key

Answers will vary, but could include the following:

Heart Transplants: ●A person who has a disease or malfunctioning heart can receive a healthy heart through a heart transplant. The donor's heart is completely removed and transported in a special solution. During the operation, the transplant patient is placed on a heart/lung machine. ●Benefits: There is a potential to live longer than without the transplant. Costs: The immune system automatically attacks anything foreign (the new heart is foreign). Medication must be taken to avoid "rejection." Rejection medication makes the body's immune system weak. About 70% of the patients live for five years or more. ●Some people feel the costs outweigh the benefits.

Antibiotics & Resistance: ●Antibiotics are created in laboratories, produced in mass by pharmaceutical companies, and prescribed by doctors to patients to treat infections. ●Benefits: Antibiotics kill or inhibit the growth of bacteria that invade the body and have helped humans overcome infections they once died from. Costs: When antibiotics are used improperly, the bacteria exposed to the antibiotics become resistant. Resistant bacteria can outlive a treatment of antibiotics. Therefore, the antibiotics no longer fight infections and are no longer useful. Patients not treated successfully may die. ●Antibiotics do not cure all infections, and their over-use has caused problems that cannot currently be solved.

Chemotherapy: ●The use of one or several drugs to kill cancer cells. ●Benefits: Chemotherapy may cure cancer, keep the cancer from spreading, slow the cancer's growth, and/or relieve symptoms that may be caused by the cancer. Costs: Common side effects include nausea and vomiting, fatigue, and hair loss. Chemotherapy drugs kill many healthy cells, as well as cancer cells. ●Many people may find that the costs outweigh the benefits. Many people do not survive cancer and/or chemotherapy.

Pesticides in Agriculture: ●Pesticides are chemicals created to treat crops and kill organisms that interfere with crop production. ●Benefits: More crops survive, farmers are more successful, and produce is available to consumers. Costs: Many pests have become resistant to pesticides. Pesticides contaminate groundwater and drinking water and can poison wildlife and people. ●While pesticides temporarily improve crop production, there are many harmful side effects.

Meal & Dietary Supplements: ●Many people who are interested in getting the correct amount of vitamins and other nutrients use dietary supplements. ●Benefits: People who use the supplements with a healthy diet more easily receive the nutrients they need. Costs: Misuse of the supplements can cause sickness. Sometimes the exact ingredients of the supplements and their long-term effects are unknown. ●Many people use the supplements as a meal replacement, however the supplements do not include everything needed for proper nutrition.

Robots Performing Human Tasks: ●Robotics and computer technology are both growing rapidly. Computers and robots are often used to replace manual labor, such as at gas stations and in factories. ●Benefits: Use of this technology cuts costs for companies. Tasks are usually done more efficiently. Costs: Human labor is lost, which means jobs are lost. ●Humans program computers and robots. Humans may make mistakes in programming. Computers and robots cannot fulfill every human need such as forming relationships with others.